The WIPP Bulletin - September 2000

"Protecting Public Health and the Environment"

Office of Radiation and Indoor Air

A Message From the New Director

By Mary Kruger

I am pleased to report that much good work is underway with our ongoing oversight of the Waste Isolation Pilot Plant's (WIPP) compliance with our regulations. EPA continues to ensure that WIPP safely contains transuranic waste. We accomplish this, indirectly, through inspections of the waste generators that transport the waste to WIPP, and, directly, through inspections of the WIPP facility itself, to ensure it is performing as expected.

Congress charged EPA with "recertifying" WIPP's continued compliance every five years after WIPP first receives waste. The first shipment of waste arrived at WIPP from Los Alamos National Laboratory in March 1999. Therefore, we expect to issue our first decision on recertification in March 2004.

The recertification process will require a great deal of preparation. One of our first priorities is to send guidance to the U.S. Department of Energy (DOE) on the information that must be in its Compliance Recertification Application (CRA). In addition, we will develop a schedule of activities that will enable both EPA and DOE to meet the recertification time frame.

We have continued our inspections of WIPP and the various DOE transuranic waste generator sites around the country. Inspections are our most reliable means of independently verifying the quality of DOE's waste characterization program; therefore, we view them as a core element of our regulatory role.

We are also continuing the important activity of keeping the public informed of our regulatory activities via our toll-free information line and website announcements, as well as Federal Register notices and Docket materials.

EPA continues to work with other interested organizations, such as New Mexico's Environmental Evaluation Group (EEG). It is my pleasure to congratulate the new Director of EEG, Matthew Silva. Matt and I have already had several productive conversations about EPA-EEG coordination, and I look forward to continued collaboration with Matt in the future.

This Bulletin contains a number of other short features about more specific aspects of EPA's regulation of the WIPP. As always, I welcome your comments and questions regarding this publication and EPA's role as WIPP regulator.

More Information

- Contacting EPA (phone, fax, U.S. mail, and e-mail information)
- WIPP transportation information (links to other Websites)
- WIPP Dockets (contents and locations)

Recertification: The New Frontier

By Agnes Ortiz

On March 1999, the first shipment of transuranic waste passed through the gates of the WIPP. This event started the clock for the process called "recertification." The WIPP Land Withdrawal Act requires DOE to submit documentation that the WIPP remains in compliance with EPA's approval. Recertification will take place every five years after emplacement of waste begins, and until the closure of this facility, in about 35 years.

March 2004, is the expected time frame of the first recertification of the WIPP facility. In the spirit of new beginnings and taking advantage of our collected wealth of knowledge, we want to share our approach to recertification and illustrate how the new process will work. EPA envisions the recertification process as a comprehensive regulatory strategy that embodies a variety of communication and regulatory tools.

Reporting

EPA envisions the recertification process as the culmination of the Change Reporting mechanism required under 40 CFR 194.4(b)(4). DOE submits a Change Report in November of each year. This report documents the changes to the WIPP program that were made during the previous year.

Because of the change reporting mechanism, when we reach the time of recertification there should be only a few items that have not been previously considered. The Compliance Recertification Application should include:

- all change reports submitted for the first four years of the 5-year recertification period, plus the change report for the fifth year (that is, the year immediately preceding the submission of the CRA);
- a summary description of the nature and impact of any changes for which EPA required a modification of the certification (if applicable); and
- information required under 40 CFR 194.15

All of the information regarding the Change Reports is being docketed. Also, all of the information the DOE submits, related to recertification, will be docketed and the public will have 30 days to comment on any of this material.

Modifications

If, in the course of our discussions about proposed changes at WIPP, EPA decides that a proposed change is significant, then we will conduct a modification rulemaking in accordance with Sections 194.65 and 194.66 of the WIPP Compliance Criteria. The "significance" of a change may be generally understood as the extent of the impact the change has on the disposal system's containment of radionuclides. However, there are other factors that could lead us to determine that a change is significant, such as: the extent to which the proposal differs from the baseline Compliance Certification Application or CRA.

Once EPA has reviewed the technical basis for a change, EPA will make the determination about the significance of changes to the WIPP program. If the change is significant, EPA will initiate its informal rulemaking process which requests public comment on EPA's proposed decisions.

A modification rulemaking may occur at any time prior to submission of the CRA, and more than one rulemaking may take place during a five-year recertification window. At present, we have no specific plans to conduct a modification rulemaking.

It is EPA's intent to both facilitate the approval of non-significant changes, as well as to fully exert our regulatory authority in a reasonable and expedient manner. Our new frontier looks promising and challenging as we move forward into our future endeavors. As always, EPA will continue to work closely with the public, the WIPP stakeholders, and the DOE to ensure that the WIPP facility continues to be safe. For more information contact, the Center for Federal Regulations at

(202)564-9310 or visit our website.

Inspecting the WIPP
By Chuck Byrum

During the week of June 19, 2000, EPA performed three inspections to verify that DOE is continuing to operate the WIPP safely:

1. Subpart A inspection
2. Monitoring inspection and
3. Emplacement inspection.

Subpart A is the requirement of our rule (40 CFR Part 191) that governs radiation safety while the WIPP is receiving and disposing of TRU radioactive waste. This standard sets stringent requirements on any radioactive releases during normal handling of waste and any releases that may take place during accidents.

The Subpart A inspection is designed to answer three questions:

1. Does DOE have a sampling system that can capture any possible releases of radioactive material?
2. Does DOE have the laboratory analytical facilities to measure the amount of radioactivity detected?
3. Does DOE demonstrate the capability to calculate the estimated radiation dose to members of the public?

To answer these questions the Agency inspectors review sample filters and equipment, measurement techniques, interview WIPP staff members and inspect DOE's radio-chemistry laboratory at the site. The Agency determined that the DOE has a very good Subpart A program at the WIPP.

The second inspection involved the Monitoring inspection. DOE committed to measure ten important parameters that may impact the future performance of WIPP. These parameters include geomechanical, hydrological, waste, subsidence, and oil and gas drilling. DOE is required to report the results of its monitoring programs annually. The purpose of EPA's inspection is to verify that DOE's monitoring program is effective and seeks out any unexpected changes in the important parameters.

As part of the monitoring inspection, EPA inspectors examined underground sampling programs, various sampling locations around the WIPP site, and reviewed annual reports generated by DOE. Our inspectors found that DOE has an effective monitoring program.

The last inspection performed was the Emplacement inspection. EPA inspected the procedures and methods used to place waste containers in the underground repository. As part of the certification decision issued by EPA in May of 1998, DOE is required to dispose of waste using specific techniques. For example: magnesium oxide is placed on top of waste stacks to act as a chemical buffer, the stack of drums is to be only three high, and DOE is required to keep detailed records about the location and contents of each drum.

Inspectors reviewed DOE's computer database, examined how the waste is placed underground, and reviewed procedures used to control the emplacement process. Our inspectors found that DOE's emplacement program is in compliance with EPA regulations.

The reports for these and other inspections can be found in our docket. EPA will continue to conduct inspections of the WIPP site to ensure compliance with the certification decision.

Waste Shipments

The number of shipments from transuranic waste sites to the WIPP as of mid-August is listed below. Each shipment could contain as many as 42 drums of radioactive waste.

- Rocky Flats 49
- Los Alamos 17
- Idaho 7
- Hanford

"Raising the Roof" at WIPP
By Chuck Byrum

DOE is changing how it mines out certain waste disposal areas underground by moving the top of the mine to a rock unit known as the "Clay Seam G" layer. The new ceiling in some of the so-called "panels," which each contain seven waste disposal rooms, will be raised about six feet.

The salt bed in which the WIPP has been mined is quite elastic, which means that the salt rock moves fairly quickly to fill a space that has been opened inside of it. This characteristic makes salt a desirable medium to encapsulate waste over the long term. However, it poses challenges for mining operations, because pressure from higher rock layers pushes down on the salt "roof" of a room so that it eventually collapses. Costly maintenance and artificial support, such as inserting long rock bolts and removing loose rock material, are needed to protect mine workers.

Moving the top of the waste panel excavation to Clay Seam G creates a remarkable dynamic. It redistributes the rock forces in such a way that the pressure on the roof of each waste room is reduced, which makes the roof much more stable and therefore safer for miners. There are some locations in the underground where the roof was raised to Clay Seam G. These areas have been stable for more than five years, and show much less salt movement than other parts of the mine that were not raised to this level.

We reviewed this new mining approach and agree that it results in a much more stable mine environment. In our judgment, the long-term impact of this change on the WIPP's containment of radioactive waste will be negligible. Raising panel rooms to Clay Seam G should not affect the performance of the repository in any way. Our report on this subject is available in our docket.

Site Inspection Update
By Mike Eagle

Two important activities are performed at various sites across the country. One of these activities is called Waste Characterization (WC). For WC, large numbers of drums containing waste are "characterized" to know what is in the waste before it goes into the WIPP. WC includes measuring the amount of transuranics inside the drums. This can be done without opening the drum, and it is an important activity affecting containment of waste in WIPP because if the WC is not done properly then too much transuranics could be inadvertently placed inside the WIPP. WC is performed at DOE sites like the Los Alamos site in New Mexico and the Rocky Flats site in Colorado. EPA inspectors watch the WC activity to ensure high quality. In most cases, EPA inspectors will stay a week at a site and check the following:

- Are the people performing the WC qualified to do the job?
- Is the equipment used for WC good enough to do the job?
- Are the procedures used to run the WC equipment good procedures?

- Is the waste characterized correctly?

The other activity is called Quality Assurance (QA). For QA, DOE inspectors determine if the WC activity is of high quality. This is important because the EPA inspectors cannot be at every site all the time. The DOE QA inspectors do not perform any WC activities. Their job is to watch, and make sure that WC is done properly. The DOE inspectors are able to immediately stop and reject any WC activity that is not of high quality. The EPA inspectors travel to the DOE sites to periodically check that the DOE QA inspectors have the proper independence, qualification and authority.

When the EPA determines that a site has good WC and QA programs, then the site may dispose of its waste at WIPP. Before the site can ship the waste to the WIPP, it must also comply with other requirements that are not checked by the EPA. For example, there are transportation requirements that are under the authority of the Department of Transportation and the Nuclear Regulatory Commission. And there are hazardous waste disposal requirements that are under the authority of the State of New Mexico. Presently, there are four sites that are disposing their waste at WIPP. These EPA-approved sites are the Los Alamos site in New Mexico, the Rocky Flats site in Colorado, the Idaho site, and the Hanford site in Washington State. More DOE sites are developing WC and QA programs, and when they are ready, DOE will request an inspection from EPA.

The EPA field inspections have taken place since 1997. Since January 2000, EPA performed the following inspections:

- In early January, EPA performed its annual inspection of the QA program of DOE's Carlsbad Area Office at New Mexico, and determined that DOE's QA program was properly maintained. CAO's QA program was initially approved by EPA in December of 1996.

- In late January, EPA inspected the WC processes and QA programs of the Hanford site in Washington State. The Agency approved the QA programs of Hanford but determined that some improvements were required for the WC processes. Waste shipments were stopped until a follow-up inspection could be conducted.

- The Agency conducted a follow-up inspection of the Hanford site in March and verified that WC processes had been adequately improved. Therefore, the EPA determined that Hanford site could send some transuranic wastes to the WIPP site in New Mexico.

- In March and April, EPA inspected the WC processes and QA programs of the Rocky Flats site in Colorado. The Agency approved the QA programs and WC processes of Rocky Flats site.

- In April, EPA inspected the WC processes and QA programs of the Idaho site. The Agency approved the QA programs of the Idaho site but determined that some improvements were required for the WC processes. Waste shipments were stopped until a follow-up inspection could be conducted.

- The Agency conducted a follow-up inspection of the Idaho site in May and verified that WC processes had been adequately improved. Therefore, the EPA determined that the Idaho site could send some transuranic wastes to the WIPP site.

- In August, EPA inspected the QA program of the WIPP facility at New Mexico, and determined that the WIPP facility's QA program was properly maintained.

For further information on EPA's WIPP activities, please call the WIPP Information Line at 1-800-331-WIPP.

Look at the WIPP Performance Assessment

By Tony Wolbarst

In the last issue of The WIPP Bulletin, the Technical Corner briefly introduced the WIPP Performance Assessment. The WIPP PA is a massive, computer-based calculation that models, or mathematically mimics, the physical behavior of the

repository and its waste over time, either with human intrusions (such as the boring of deep holes into or through the repository) or without. It can thereby assess WIPP's ability to comply with the containment, groundwater protection, and individual annual dose requirements specified in the TRU waste disposal standards at 40 CFR 191.

Ultimately, the WIPP PA computes how likely it is that various amounts of radioactive waste might escape from the repository into the nearby environment. That computation involves issues such as the physical properties of the rock materials from which the repository was dug - how porous, fractured, compressible, and so on - which determines the rate at which contaminated groundwater might be pushed offsite if, for example, pressure happened to build up within the repository. Such pressure might arise if biological and chemical processes affecting the wastes occur which yield carbon dioxide, hydrogen, and other gases. The computation must also account for the possibility that exploratory oil wells, drilled perhaps thousands of years from now, might intersect the pressurized repository, providing a man-made pathway for the release of wastes into the environment. The question of interest, of course, is just how much contamination might actually reach the accessible environment and expose people.

The amount of radioactive waste that might escape from the repository because of some event or process is called its 'normalized release.' What gets out over 10,000 years through a particular sequence of events and processes is the 'cumulative normalized release' for the sequence. (Such a sequence is known as a 'future.') The unit used to quantify normalized releases and cumulative normalized releases has come to be known as the 'EPA Unit'. Normalized release is closely related to 'activity', or quantity of radioactive material, the units of which are curies (Ci) or becquerels (Bq).

With an ideal repository, there would be absolutely no releases of waste. But few things in life are ideal or absolute, and for the WIPP in particular, EPA has adopted a more realistic objective: Before EPA would certify WIPP for operation, the PA had to demonstrate convincingly that the following is true:

It is very unlikely that even small amounts of waste will get out of the repository over the next 10,000 years - and even less probable that larger releases might occur.

The point is that there may be releases, but they will be of little consequence if they are sufficiently small and improbable. EPA's Containment Regulation at 40 CFR 191.13 spells out specifically and precisely what is meant by small and improbable: "...the cumulative releases of radionuclides to the accessible environment of 10,000 years after disposal from all significant processes and events that may affect the disposal system shall:

- Have a likelihood of less than one chance in 10 of exceeding [a cumulative normalized release of 1 EPA unit]; and
- Have a likelihood of less than one chance in 1,000 of exceeding [a cumulative normalized release of 10 EPA units]."

Perhaps the first thing to catch your eye about all this is that it is couched in the language of probability and likelihood, of playing the odds. This is so because there are unavoidable uncertainties of various sorts in any analysis of potential future releases from the WIPP. Some of these arise because of natural variations over space and time of physical properties of the materials in and around the repository. Some reflect other kinds of lack of exact knowledge about the physical characteristics of the materials surrounding and stored within the repository chambers. And some come from our inability to foretell the drilling and mining intrusions into the repository that might occur in the future. Because of these uncertainties, "Proof of the future performance of a disposal system is not to be had in the ordinary sense of the word," as noted in the Containment Requirement. In particular, one cannot be completely sure that absolutely no waste will escape the repository over time, but EPA's regulation demands that there be a high degree of confidence that no more than a small amount could be released.

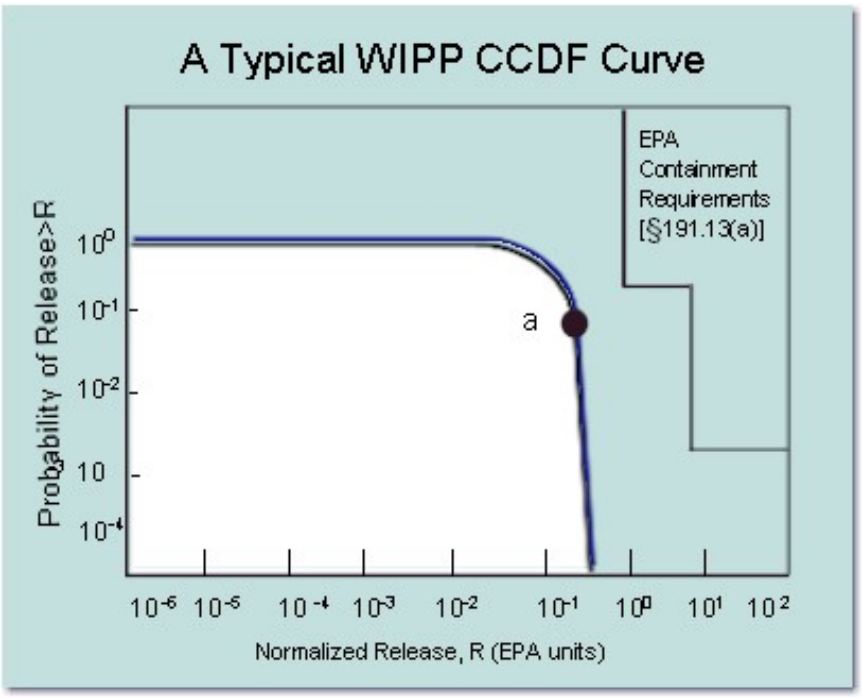
To summarize the above: It is not possible to predict with certainty either the behavior of the repository itself over a long time under various possible intrusion scenarios, or the sequence of human intrusion events that might take place and disturb it. What one can do, however, is compute the probabilities that different kinds of intrusions might occur, and when, and then calculate, under a wide variety of possible physical conditions within the repository, the amount of TRU waste that could be transported to the accessible environment if any such intrusion were to occur. By carrying out literally millions of such calculations, one can obtain a good statistical average estimate of the probability that any particular level

of release might be exceeded.

This kind of information can be displayed in useful graphical form, by means of a Complementary Cumulative Probability Function (CCDF). The average CCDF curve reveals the probability that the normalized release accumulating over 10,000 years will be greater than any particular value. The values that the CCDF curve can assume will range from 1 to 0 as the cumulative normalized release increases from 0 (or a very small number) to its maximal value.

The Containment Requirement itself spelled out in § 191.13(a) can be represented as an "exclusion region" defined by the two points (1, 0.1) and (10, 0.001), where the first entry refers to cumulative normalized release and the second to probability. The repository will be in compliance if it is sufficiently clear that the mean CCDF curve lies to the left of the exclusion zone.

The next Technical Corner will begin discussing how CCDF curves are created.



Contacts and On-Line Resources - WIPP Transportation Information

Exit EPA Please be aware that we do not control or guarantee the accuracy, relevance, timeliness, or completeness of this outside information.

WIPP Facility TRU Waste Transportation

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Introducing NSC's New Radiation Information Kit

By Cheryl Malina

How big a risk does radiation pose to our families, our environment and to future generations? What should individuals and society do to ensure that the benefits of radiation are not outweighed by the risks? These questions and others are answered in a new Radiation Information Kit that will soon be available to educate journalists, teachers, and community organizations about radiation issues. The kit contains:

- "A Look at Radiation" - a 10-minute video on radiation as part of our everyday life;
- "Managing Radiation" - a 10-minute video on how Federal and State governments manage radiation;
- "Exploring Radiation" - an illustrated guidebook covering in-depth issues on radiation; and
- Supplemental texts directed specifically towards journalists and teachers.

The goal of these materials is to help people make informed judgements on important radiation issues that affect their health and the well-being of their families and communities.

The kit is being developed through a cooperative agreement between EPA and the National Safety Council (NSC), and will be available in December. Single copies of the kit or just the guidebook - "Exploring Radiation" - are free and can be ordered from:

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